Technical Memorandum for the Intracoastal Waterway Sediment and Surface Water Data
Gulfco Marine Maintenance Site
Freeport, Brazoria County, Texas
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1.0 INTRODUCTION

This Biota Sample Collection Technical Memorandum has been prepared in response to the 18 September 2006 letter to the U.S. Environmental Protection Agency (EPA) from Pastor, Behling &Wheeler, LLC (PBW) concerning the Intracoastal Waterway Sediment and Surface Water Data at the Gulfco Marine Maintenance (Gulfco) Superfund Site, Freeport, Texas. In the letter, PBW summarized sediment data, developed human health screening levels for the fish/biota ingestion pathway, and compared sediment data to the screening levels. Based on the sediment screening level comparison, PBW concluded that "a fish tissue sampling program to evaluate Site risks is no longer appropriate and should not be performed." This Technical Memorandum was prepared to evaluate PBW's conclusions (i.e., fish tissue sampling is not warranted) and to determine an appropriate analyte list for biota sampling, if necessary.

General technical review comments and recommendations are provided in Section 2.0. Section 3.0 details the analyte list for the fish/biota sampling program. Specific technical review comments pertaining to the screening levels and biota-sediment accumulation factors (BSAFs) developed by PBW are provided in Section 4.0.

2.0 GENERAL TECHNICAL REVIEW COMMENTS AND RECOMMENDATIONS

Eliminating the fish/biota ingestion pathway before cumulative risks are estimated is a risk management decision that eliminates a potentially complete exposure pathway and will ensure an underestimation of cumulative risks (i.e., risks from a group of chemicals via various pathways). Eliminating this pathway could alter a risk management decision because cumulative risks from all pathways (e.g., ingestion, dermal contact, and inhalation) and media (e.g., soil, sediment, and biota) are not considered. Carcinogenic risk and noncarcinogenic hazard estimates are necessary to determine if remedial action (e.g., dredging sediments or institutional control to limit the fish ingestion pathway) is necessary.

According to the Sampling and Analysis Plan (SAP) (PBW 2006), fish/biota were to be examined for morphological abnormalities in addition to the collection of fish/biota tissue data. This information may be important to a potential weight-of-evidence evaluation in the ecological risk assessment. The collection of fish/biota is vital to both the human health risk assessment (HHRA) and ecological risk assessment (ERA). Fish and biota tissue samples should be collected as outlined in the Remedial Investigation and Feasibility Study (RI/FS) Work Plan (PBW 2005) and SAP (PBW 2006).

3.0 FISH/BIOTA TISSUE ANALYTE LIST

Chemicals that should be included in the fish/biota tissue sampling include all organic compounds that were presented on Table 4 as well as the four inorganic compounds (copper, mercury, nickel, and zinc) that were considered bioaccumulative. In addition, the following analytes were detected in sediments, considered bioaccumulative, and should be included in the fish/biota tissue sampling. Duplicate entries were not eliminated from the lists.

Notice of Availability of Draft Resource Conservation and Recovery Act Waste Minimization Persistent, Bioaccumulative, and Toxic (PBT) Chemical List (U.S. Environmental Protection Agency [EPA] 1998):

- 2-Methylnaphthalene
- Antimony
- Arsenic
- Beryllium
- Butyl benzyl phthalate
- Chromium (assume hexavalent chromium to be consistent with EPA 2000b)
- Lead

Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment (EPA 2000b):

- Arsenic
- Hexavalent chromium (detected in water samples)
- Lead
- Silver

4.0 SPECIFIC TECHNICAL REVIEW COMMENTS

Specific technical review comments are discussed in the following subsections.

4.1 SCREENING LEVEL SPECIFIC COMMENTS

Using a target carcinogenic risk level of 1E-05 in the derivation of screening levels is a risk management decision. If several chemicals have sediment concentrations just below the screening level (i.e., with carcinogenic risks just below 1E-05), it is likely that significant carcinogenic risks would be eliminated from consideration. A Tier 1 screening level should be conservative (e.g., based on a target carcinogenic risk level of 1E-06) so that there is little potential for underestimating risks. Finally, using a target

carcinogenic risk level of 1E-05 in the screening level determination is inconsistent with the RI/FS Work Plan (PBW 2005), which states:

> "If estimated risks, based on the fish tissue sampling, exceed the lower end of EPA's target risk range of 1 in 1,000,000 to 1 in 10,000 (i.e., 1 in 1,000,000) or a hazard quotient of 1, background fish samples will be analyzed for those constituents posing an unacceptable risk."

The default fish ingestion rate (0.015 kilogram/day [kg/day]) equates to approximately two fish meals per month, which "may significantly underestimate typical fish consumption for a given high-end recreational or subsistence population" (Texas Commission on Environmental Quality RG-366/TRRP-24; Section 5.2.2.1). The Texas Department of Health uses a fish ingestion rate 0.030 kg/day (approximately four fish meals a month) to determine if an advisory/closure of a water body. A Tier 1 screening level should be conservatively based so that there is little potential for underestimating risks to highly exposed receptors (e.g., subsistence population). A more appropriate ingestion rate may be 0.1424 kg/day for a subsistence population (Table 2-1; EPA 2000a).

The U.S. Food and Drug Administration action levels for edible fish and shellfish tissue should be incorporated into the screening level determination, as necessary. The lower of the two values should be used in the final screening level determination (Texas Administrative Code, Title 30, Part 1, Chapter 307[d][3][H])

The bioaccumulation factor (BAF) in Appendix B has units of liters per kilogram (L/kg), which indicates that it is a ratio of tissue and water concentrations rather than the tissue and sediment concentrations (unitless) that should be used in this evaluation.

4.2 BIOTA-SEDIMENT ACCUMULATION FACTOR SPECIFIC COMMENTS

Inorganic BSAFs used in the screening level determination are not appropriate; BAFs should be used in lieu of BSAFs for inorganic compounds. Also, the use of BSAFs for all organic compounds was incorrectly applied in the screening level determination according to EPA 2005, which states:

> "These factors are applied only to polychlorinated dibenzodioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs)…"

The methodology should be modified or the reference should be changed to EPA 2000b, which states:

> "This lipid-normalized relationship was developed for neutral (nonioinic) organic compounds and is not appropriate for inorganic substances (e.g., metals)…"

Site-specific organic carbon content and site- and species-specific lipid content must be used in any screening level determination according to EPA 2000b, which states:

> "Accurate information on organism lipid content and sediment total organic carbon (TOC) content is required to calculate a BSAF. Lipid content can vary considerably within a single species, based on life stage, sex, and season, so caution is necessary when attempting to use site- or species-specific BSAFs as predictors of tissue burdens in different systems."

Although sediment may be the primary contributor to biota tissue chemical bioaccumulation, surface water is the primary contributor for other species. Therefore, only including sediments concentrations in a Tier 1 screening is inadequate according to EPA 2005, which states:

> "The greatest uncertainty associated with using BSAFs is that some species of fish have limited, if any, contact with water body sediments. Any accumulation of compounds into the tissue of these fishes is almost entirely the result of contact with surface water."

REFERENCES

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